IN THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the Application:

LISTING OF CLAIMS:

1. (Currently amended) A system for coherent beam combination comprising:

an unstable resonator;

at least two gain media located within said unstable resonator;

wherein a first electromagnetic field produced by a first gain medium of said at least two gain media propagates through a portion of a second gain medium of said at least two gain media after one or more roundtrips within said unstable resonator; wherein said first electromagnetic field is in-phase with a second electromagnetic field produced by said second gain medium,

and wherein the at least two gain media are placed in a plane transverse to a longitudinal axis of the unstable resonator, each gain medium being positioned an equal distance away from and on a different side of the longitudinal axis of the unstable resonator

wherein said at least two gain media are parametric gain media.

2. (Original) The system of Claim 1, further comprising an output beam exiting said unstable resonator.

3. (Previously presented) The system of Claim 2, wherein said output beam has an intensity proportional to an amplitude product squared, said amplitude product being an amplitude of said first electromagnetic field multiplied by an amplitude of said second electromagnetic field.

4. (Cancelled)

5. (Cancelled)

6. (Previously presented) The system of Claim 1, wherein said first and second gain media are separated by a separation distance between about 100 microns to about five millimeters.

7. (Previously presented) The system of Claim 1, wherein said first and second gain media are separated by a separation distance of about 1 millimeter.

8. (Original) The system of Claim 1, further comprising a heat-conducting element in contact with said at least two gain media.

9. (Original) The system of Claim 8, wherein said heat-conducting element lies in a plane transverse to a longitudinal axis of said unstable resonator.

10. (Original) The system of Claim 9, wherein said heat-conducting element contacts portions of said at least two gain media that are parallel to said longitudinal axis.

11. (Original) The system of Claim 8, wherein said heat-conducting element is made of diamond or amethyst.

12. (Original) The system of Claim 11, wherein said diamond is optical quality diamond.

13. (Cancelled)

14. (Currently amended) The system of Claim ~~5~~ 1, wherein said parametric gain media are quasi-phase-matched (QPM) nonlinear crystals.

15. (Currently amended) The system of Claim ~~5~~ 1, wherein said parametric gain media are birefringent nonlinear crystals.

16. (Original) The system of Claim 14, wherein said parametric gain media are selected from the group consisting of periodically twinned gallium arsenide (PTGaAs), periodically poled lithium niobate (PPLN), periodically poled KTP (PPKTP), periodically poled RTA (PPRTA).

17. (Original) The system of Claim 15, wherein said parametric gain media are selected from the group consisting of ADP, BBO, GaSe, $CdGa_2S_4$, CdSe, $CdGeAs_2$, $LiNbO_3$, $LiTaO_3$, LBO, KDP, KTP, $AgGaS_2$, $AgGaS_2$, and proustite.

18. (Original) The system of Claim 1, wherein said at least two gain media comprise four gain media.

19. (Original) The system of Claim 18, wherein said four gain media are in a two-by-two array.

20. (Original) The system of Claim 1, wherein said unstable resonator is a negative or positive-branch unstable resonator.

21. (Original) The system of Claim 1, wherein said unstable resonator is a confocal unstable resonator.

22. (Original) The system of Claim 21, wherein said confocal resonator is a confocal-planar or confocal-convex unstable resonator.

23. (Original) The system of Claim 1, wherein said unstable resonator is an unstable ring resonator.

24. (Currently amended) A method for coherent beam combination comprising the steps of:

producing a first electromagnetic field from a first gain medium;

producing a second electromagnetic field from a second gain medium;

expanding said first and said second electromagnetic fields in an unstable resonator having a magnification factor; and

coherently combining said expanded first electromagnetic field with said expanded second electromagnetic field,

wherein the first gain medium and second gain medium are placed in a plane transverse to a longitudinal axis of the unstable resonator, each gain medium being positioned an equal distance away from and on a different side of the longitudinal axis of the unstable resonator, and said step of producing a first electromagnetic field further comprises producing signal and idler fields.

25. (Original) The method of Claim 24, further comprising producing an output beam with an intensity that is proportional to an amplitude product squared, said amplitude product being an amplitude of said first electromagnetic field multiplied by an amplitude of said second electromagnetic field.

26. (Cancelled)

27. (Original) The method of Claim 24, further comprising producing a third electromagnetic field and expanding said third electromagnetic field in said unstable resonator.

28. (Original) The method of Claim 27, further comprising coherently combining said expanded third electromagnetic field with said expanded first and said second electromagnetic fields.

29. (Original) The method of Claim 24, further comprising removing heat from said first and said second gain media.

30. (Cancelled)

31. (Previously Presented) The system of claim 1, wherein the at least two gain media are placed at or near the midpoint of the distance between first and second mirrors of the unstable resonator.

32. (Previously presented) The system of claim 31, wherein the at least two gain media are placed near the midpoint of the length of the unstable resonator.

33. (Cancelled)

34. (Previously Presented) The method of claim 24, wherein the first gain medium and second gain medium are placed at or near the midpoint of the distance between first and second mirrors of the unstable resonator.

35. (Previously Presented) The method of claim 34, wherein the first gain medium and second gain medium are placed near the midpoint of the length of the unstable resonator.

36. (New) The system of Claim 1, wherein the unstable resonator has a circular cross section.

37. (New) The system of Claim 36, wherein the unstable resonator includes a convex mirror at one end and a concave mirror at an opposite end, and wherein the gain media are disposed between the convex mirror and the concave mirror.